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Fertilizer management for seed production of perennial forage crops in the Canadian Great Plains

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Introduction In the Canadian prairies , nitrogen (N) and phosphorus (P) are most commonly deficient nutrients , while potassium (K) and sulphur (S) may also be deficient for certain crop and soil conditions . One or more of these four major nutrients may be limiting for optimum forage seed yield . Perennial forages respond well to the application of fertilizers on nutrient deficient soils . The purpose of this report is to summarize research information on fertilizer management for improving seed production of perennial forages in the Canadian Great Plains .

Results and discussion

1) Nitrogen : For grasses , N fertilizer application produced substantial increase in seed yield , but the magnitude of increase varied with weather conditions in the growing season (Buglass 1964 ; Loeppky et al . 1999) , grass species (Loeppky et al . 1999) and soil characteristics (Thompson and Clark 1989 ; Loeppky et al . 1999) . The best N source for surface-broadcast application was ammonium nitrate (Knowles and Cooke 1952) , but it may not be widely available in the market . Urea is now becoming the most commonly used N fertilizer , but it is highly vulnerable to ammonia volatilization when surface-applied . In general , all N sources can be equally effective when applied properly (e .g . , placed below the soil surface) . Autumn application usually produced higher seed yield than spring application (Knowles and Cooke 1952 ; Lawrence and Kilcher 1964 ; Buglass 1964 ; Ukrainetz 1969) . Legumes coexist with *Rhizobium or Sinorhizobium* bacteria in soil that can induce nodulation and convert N_2 from the air to a form that is available to plants . Consequently , no N fertilizer is required for legumes , provided legumes are inoculated with appropriate bacteria (Horton 1991 ; Loeppky et al . 1999) .

2) Phosphorus : For grasses , application of P increased seed yield of dryland Altai wildrye grass (Lawrence 1980) , timothy and crested wheatgrass (Loeppky et al . 1999) . Seed yield response of smooth bromegrass to N and P fertilizers was also affected by the amount of available N and P in the soil Unlike N , P is relatively immobile in soil (Malhi et al . 2003) , and tends to have a more lasting residual effect (Lawrence 1980) . For this reason , placement of P fertilizer into the soil , where it will be directly intercepted by roots , is very important (Malhi et al . 2001) . For legumes , application of P can increase longevity of stands by several years , and produced a significant increase in seed yield of alfalfa (Loeppky et al . 1999) .

3) Potassium : Improved soil K fertility decreases incidence of winter injury in legume stands by increasing accumulation of carbohydrates in the root system (Bailey 1983) , and increases longevity and seed yield of alfalfa stands . Banding is the preferred method of application .

4) Sulphur : Both legume and grasses respond to S fertilizer when soil is deficient in plant-available (S . S . Malhi-unpublished results) .

5) Miconutrients : Most soils are adequately supplied with micronutrients and their deficiencies are rare on forages for seed production .

Conclusions For grasses , N fertilizer application produced the greatest seed yield increase , when other nutrients were not limiting in the soil , and magnitude of seed yield increase was much higher under cool moist conditions than dry conditions in the growing season . Surface-applied ammonium nitrate was more effective than other ammonium-based fertilizers . Autumn-applied N usually produced higher grass seed yield than spring-applied N . For legumes , focus should be on correcting P , K and S deficiencies , as these plants have the property of fixing N_2 from the air when properly inoculated . Whenever possible , fertilizers (particularly P , K and urea N) should be banded (or injected) into the soil for most efficient use of the nutrients .

References

Bailey , L .D . 1983 , Effect of potassium fertilizer and fall harvests on alfalfa grown in the eastern Canadian prairies . *Can . J . Soil Sci .* , 63 , 211-219 .

Buglass , E . 1964 , Seed production of crested wheatgrass as influenced by various management practices . *Can . J . Plant Sci .* , 44 , 66-74 .

Horton , R . 1991 , Fertilization for optimum alfalfa seed production in northeastern Saskatchewan . Pages 31-36 *in* D .W . Goerzen ed . , Proc . *10th Annual Canadian Alfalfa Seed Conference* , 10-12 January , 1991 , *Canadian alfalfa Seed Council* , Saskatoon , Saskatchewan , Canada .

Knowles , R .P . , and Cooke , D .A . 1952 , Response of bromegrass to nitrogen fertilizers . *Sci . Agric .* , 32 , 548-554 .